SEQUENCE LISTING

<110> Broekaert, Willem Francois, Isabelle Evans, Ian De Bolle, Miguel Ray, John

<120> Genetic Method For The Expression of Polyproteins in Plants

<130> PPD50348/UST

<140><141>

<150> GB 9818001.1

<151> 1998-08-18

<150> GB 9826753.7

<151> 1998-12-14

<150> PCT/GB99/02716

<151> 1999-08-17

<160> 81

<170> PatentIn Ver. 2.1

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<213> Dahlia merckii

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1 5 10 15

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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys
45

Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His

50 55 60

Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Lys 65 70 75 80

Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu Gln Leu Ala Gln 85 90 95

Asp Lys Leu Asn Ala Gln Lys Leu Asp Arg Asp Ala Lys Lys Val Val 100 105 110

Pro Asn Val Glu His Pro 115

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<212> PRT

<213> Artificial Sequence

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<223> Description of Artificial Sequence: Linker propeptide

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Val Val Pro Asn Val Glu His Pro 35 40

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<210> 7

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Ile Gly Lys Arg

<210> 8

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<213> Amaranthus caudatus

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ctg atc ctt ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga 1 Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly 15 20 25	59
gaa cta tgc gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac 20 Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn 30 35 40	07
acg gga cat tgt gac aac caa tgt aaa tca tgg gag ggt gcg gcc cat Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His 45 50 55 60	55
gga gcg tgt cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc 30 Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe 65 70 75	03
aat tgt tcc aac gct gct gac gag gtg gct acc cca gag gac gtg gag 35 Asn Cys Ser Asn Ala Ala Asp Glu Val Ala Thr Pro Glu Asp Val Glu 80 85 90	51
cca gga cag aag ttg tgc caa agg cca agt ggg aca tgg tca gga gtc 39 Pro Gly Gln Lys Leu Cys Gln Arg Pro Ser Gly Thr Trp Ser Gly Val 95 100 105	99
tgt gga aac aat aac gca tgc aag aat cag tgc att aga ctt gag aaa 44 Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys 110 115 120	17
gca cga cat gga tct tgc aac tat gtc ttc cca gct cac aag tgt atc Ala Arg His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile 125 130 135 140	₹5
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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys 35 40 45
Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His 50 55 60
Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser Asn 65 70 75 80
Ala Ala Asp Glu Val Ala Thr Pro Glu Asp Val Glu Pro Gly Gln Lys 85 90 95
Leu Cys Gln Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn 100 105 110
Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly 115 120 125
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Cys 145
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ctg atc ctt ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga 159 Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly 15 20 25

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Glu Leu Cys 30	Glu Lys	Ala	Ser 35	Lys	Thr	Trp	Ser	Gly 40	Asn	Cys	Gly	Asn	
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gga gcg tgt Gly Ala Cys	cat gtg His Val 65	cgt a	aac Asn	gly ggg	aaa Lys	cac His 70	atg Met	tgt Cys	ttc Phe	tgt Cys	tac Tyr 75	ttc Phe	303
aat tgt aaa Asn Cys Lys													351
caa ctc atc Gln Leu Ile 95			Gln										399
tgg tca gga Trp Ser Gly 110		Gly A											447
aga ctt gag Arg Leu Glu 125													495
cac aag tgt His Lys Cys	_				_	taa	tag	gagct	c				534
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100 105 110

Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys 115 120 125

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Cys Tyr Phe Pro Cys 145

<210> 13

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ctg atc ctt ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga 15 Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly 15 20 25	9
gaa cta tgc gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn 30 35 40	7
acg gga cat tgt gac aac caa tgt aaa tca tgg gag ggt gcg gcc cat Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His 45 50 55 60	;5
gga gcg tgt cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc 30 Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe 65 70 75)3
aat tgt aaa aaa gcc gaa aag ctt gct caa gac aaa ctt aaa gcc gaa 35 Asn Cys Lys Lys Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu 80 85 90	;1
caa ctc gct caa gac aaa ctt aat gcc caa aag ctt gac cgt gat gcc 39 Gln Leu Ala Gln Asp Lys Leu Asn Ala Gln Lys Leu Asp Arg Asp Ala 95 100 105	19
aag aaa gtg gtt cca aac gtt gaa cat ccg atc gga aag agg cag aag 44 Lys Lys Val Val Pro Asn Val Glu His Pro Ile Gly Lys Arg Gln Lys 110 115 120	.7
ttg tgc caa agg cca agt ggg aca tgg tca gga gtc tgt gga aac aat Leu Cys Gln Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn 125 130 135 140)5
aac gca tgc aag aat cag tgc att aga ctt gag aaa gca cga cat gga 54 Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly 145 150 155	:3
tct tgc aac tat gtc ttc cca gct cac aag tgt atc tgc tac ttt cct 59 Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro 160 165 170	1

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Cys
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Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys Glu
Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys
Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His
Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Lys
Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu Gln Leu Ala Gln
Asp Lys Leu Asn Ala Gln Lys Leu Asp Arg Asp Ala Lys Lys Val Val
            100
                                                    110
Pro Asn Val Glu His Pro Ile Gly Lys Arg Gln Lys Leu Cys Gln Arg
Pro Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys
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606

Val Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 165 170

Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr

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ctg atc ctt ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga 19 Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly 15 20 25	59
gaa cta tgc gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac 20 Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn 30 35 40	07
acg gga cat tgt gac aac caa tgt aaa tca tgg gag ggt gcg gcc cat Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His 45 50 55 60	55
gga gcg tgt cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe 65 70 75	03
aat tgt gcc agt act act gtg gat cac caa gct gat gtt gct gcc acc 3! Asn Cys Ala Ser Thr Thr Val Asp His Gln Ala Asp Val Ala Ala Thr 80 85 90	51
aaa act atc gga aag agg cag aag ttg tgc caa agg cca agt ggg aca Lys Thr Ile Gly Lys Arg Gln Lys Leu Cys Gln Arg Pro Ser Gly Thr 95 100 105	99
tgg tca gga gtc tgt gga aac aat aac gca tgc aag aat cag tgc att Trp Ser Gly Val Cys Gly Asn Asn Ala Cys Lys Asn Gln Cys Ile 110 115 120	47
aga ctt gag aaa gca cga cat gga tct tgc aac tat gtc ttc cca gct Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Val Phe Pro Ala 125 130 135 140	95
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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys 40 35 Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ala Ser Thr Thr Val Asp His Gln Ala Asp Val Ala Ala Thr Lys Thr Ile Gly Lys Arg Gln Lys Leu Cys Gln Arg Pro Ser Gly Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arq His Gly Ser Cys Asn Tyr Val Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 145 <210> 19 <211> 316 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <220> <221> CDS <222> (76)..(312) <400> 19 ctcgagtatt tttacaacaa ttaccaacaa caacaacaa caaacaacat tacaattact 60 atttacaatt acacc atg gtg aat egg teg gtt geg tte tee geg tte gtt Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val ctg atc ctt ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga 159 Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly 20 gaa cta tgc gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac 207 Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn acg gga cat tgt gac aac caa tgt aaa tca tgg gag ggt gcg gcc cat Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His 50 gga gcg tgt cat gtg cgt aat ggg aaa cac atg tgt ttc tgt tac ttc 303 Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe 65

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316
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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys
Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His
Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys
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Ile Gly Lys Arg

<210> 27

<211> 28

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 propeptide

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Ile Gly Lys Arg Ile Gly Lys Arg Ile Gly Lys Arg 20 25

<210> 28

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Leu Lys Leu Ala Gly Asp Val Glu Ser Asn Pro Gly Pro 20 25

<210> 29

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<400> 29

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1 5 10 15

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	.> CI		(437)													
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tgt Cys	gac Asp	aac Asn 50	caa Gln	tgt Cys	aaa Lys	tca Ser	tgg Trp 55	gag Glu	ggt Gly	gcg Ala	gct Ala	cac His 60	gga Gly	gcg Ala	tgt Cys	191
cat His	gtg Val 65	cgt Arg	aac Asn	999 Gly	aaa Lys	cac His 70	atg Met	tgt Cys	ttc Phe	tgt Cys	tac Tyr 75	ttc Phe	aat Asn	tgt Cys	aac Asn	239
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tct Ser	tgc Cys	aac Asn 130	tat Tyr	cgt Arg	ttc Phe	cca Pro	gct Ala 135	cac His	aag Lys	tgt Cys	atc Ile	tgc Cys 140	tac Tyr	ttt Phe	cct Pro	431
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										tgt Cys		239
		_	_	 	_		 _	 _	_	aag Lys	_	287
										aat Asn 110		335
										gga Gly		383
										cct Pro		431
taa	tagg	gagct	cc									443
<210)> 33	3										

<210> 33 <211> 143 <212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic sequence

<400> 33

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Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys Glu 20 25 30

Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys
35 40 45

Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His 50 55 60

Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser Asn 65 70 75 80

Ala Ala Asp Glu Val Ala Thr Pro Glu Asp Val Glu Gln Lys Leu Cys 85 90 95

Gln Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala 100 105 110 Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys 115 120 125

Asn Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 130 135 140

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<220 <223	> De	scri quen	_	n of	Art	ific	ial	Sequ	ience	e: Sy	mthe	etic				
)> .> CI ?> (3		(428)													
cc a)> 34 atg g Met V	itg a	at o Asn <i>P</i>	gg targ s	cg g Ser V	gtt g /al /	gcg t Ala I	tc t	cc g Ser <i>P</i>	gcg t Ala E 10	tc g	gtt o /al I	etg a Leu l	atc d [le]	ett Leu 15	47
ttc Phe	gtg Val	ctc Leu	gcc Ala	atc Ile 20	tca Ser	gat Asp	atc Ile	gca Ala	tcc Ser 25	gtt Val	agt Ser	gga Gly	gaa Glu	cta Leu 30	tgc Cys	95
gag Glu	aaa Lys	gct Ala	agc Ser 35	aag Lys	acg Thr	tgg Trp	tcg Ser	ggc Gly 40	aac Asn	tgt Cys	ggc Gly	aac Asn	acg Thr 45	gga Gly	cat His	143
tgt Cys	gac Asp	aac Asn 50	caa Gln	tgt Cys	aaa Lys	tca Ser	tgg Trp 55	gag Glu	ggt Gly	gcg Ala	gct Ala	cac His 60	gga Gly	gcg Ala	tgt Cys	191
cat His	gtg Val 65	cgt Arg	aac Asn	ggg Gly	aaa Lys	cac His 70	atg Met	tgt Cys	ttc Phe	tgt Cys	tac Tyr 75	ttc Phe	aat Asn	tgt Cys	tcc Ser	239
aac Asn 80	gcg Ala	gcc Ala	gac Asp	gag Glu	gtg Val 85	gct Ala	acc Thr	cca Pro	gag Glu	gac Asp 90	cag Gln	aag Lys	ttg Leu	tgc Cys	caa Gln 95	287
agg Arg	cca Pro	agt Ser	cgt Arg	aca Thr 100	tgg Trp	tca Ser	gga Gly	gtc Val	tgt Cys 105	gga Gly	aac Asn	aat Asn	aac Asn	gca Ala 110	tgc Cys	335
aag Lys	aat Asn	cag Gln	tgc Cys 115	att Ile	aga Arg	ctt Leu	gag Glu	aaa Lys 120	gca Ala	cga Arg	cat His	gga Gly	tct Ser 125	tgc Cys	aac Asn	383
tat Tyr	cgt Arg	ttc Phe 130	cca Pro	gct Ala	cac His	aag Lys	tgt Cys 135	atc Ile	tgc Cys	tac Tyr	ttt Phe	cct Pro 140	tgt Cys	taa		428
tagg	gagct	cc														437

<210> 35 <211> 141 <212> PRT <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <400> 35 Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser Asn Ala Ala Asp Glu Val Ala Thr Pro Glu Asp Gln Lys Leu Cys Gln Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 130 <210> 36 <211> 434 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <220> <221> CDS <222> (3)..(425) <400> 36 cc atg gtg aat cgg tcg gtt gcg ttc tcc gcg ttc gtt ctg atc ctt 47 Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu 1 95 ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga gaa cta tgc Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys 20

gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac acg gga cat Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His 35 40 45	
tgt gac aac caa tgt aaa tca tgg gag ggt gcg gct cac gga gcg tgt 191 Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys 50 55 60	
cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc aat tgt tcc 239 His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser 65 70 75	
aac gcg gcc gac gag gtg gct acc cca gag cag aag ttg tgc caa agg 287 Asn Ala Ala Asp Glu Val Ala Thr Pro Glu Gln Lys Leu Cys Gln Arg 80 85 90 95	
cca agt cgt aca tgg tca gga gtc tgt gga aac aat aac gca tgc aag 335 Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys 100 105 110	
aat cag tgc att aga ctt gag aaa gca cga cat gga tct tgc aac tat 383 Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr 115 120 125	
cgt ttc cca gct cac aag tgt atc tgc tac ttt cct tgt taa taggagctc 434 Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 130 135 140	í
<210> 37 <211> 140	
<211> 140 <212> PRT <213> Artificial Sequence	
<212> PRT	
<212> PRT <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic	
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115 120 125

Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 130 135 140

210> 38 211> 485 212> DNA 213> Artificial Sequence	
220> 223> Description of Artificial Sequence: Synthetic sequence	
220> 221> CDS 222> (3)(476)	
400> 38 c atg gtg aat cgg tcg gtt gcg ttc tcc gcg ttc gtt ctg atc ctt 47 Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu 1 5 10 15	
to gtg ctc gcc atc tca gat atc gca tcc gtt agt gga gaa cta tgc 95 he Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys 20 25 30	
ag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac acg gga cat 143 lu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His 35 40 45	3
gt gac aac caa tgt aaa tca tgg gag ggt gcg gct cac gga gcg tgt 191 ys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys 50 55 60	L
at gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc aat tgt gct 239 is Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ala 65 70 75	€
ac gct gag gaa gct gct gct gct att cct gaa gct tct gaa gaa ctt 28° sn Ala Glu Glu Ala Ala Ala Ala Ile Pro Glu Ala Ser Glu Glu Leu 80 85 90 95	7
ct caa gaa gaa gct cct gtg tac agt gaa gat cag aag ttg tgc caa 33! la Gln Glu Glu Ala Pro Val Tyr Ser Glu Asp Gln Lys Leu Cys Gln 100 105 110	5
gg cca agt cgt aca tgg tca gga gtc tgt gga aac aat aac gca tgc 38: rg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys 115 120 125	3
ag aat cag tgc att aga ctt gag aaa gca cga cat gga tct tgc aac 43: ys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn 130 135 140	1
at cgt ttc cca gct cac aag tgt atc tgc tac ttt cct tgt taa 470 Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 145 150 155	6

taggagete 485

<210> 39 <211> 157 <212> PRT <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <400> 39 Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ala Asn Ala Glu Glu Ala Ala Ala Ile Pro Glu Ala Ser Glu Glu Leu Ala Gln Glu Glu Ala Pro Val Tyr Ser Glu Asp Gln Lys Leu Cys Gln Arg 105 Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys 115 Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 150 <210> 40 <211> 1093 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <220> <221> CDS

<400> 40

<222> (3)..(1085)

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Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu

	1				5					10					15	
ttc Phe	gtg Val	ctc Leu	gcc Ala	atc Ile 20	tca Ser	gat Asp	atc Ile	gca Ala	tcc Ser 25	gtt Val	agt Ser	gga Gly	gaa Glu	cta Leu 30	tgc Cys	95
gag Glu	aaa Lys	gct Ala	agc Ser 35	aag Lys	acg Thr	tgg Trp	tcg Ser	ggc Gly 40	aac Asn	tgt Cys	ggc Gly	aac Asn	acg Thr 45	gga Gly	cat His	143
tgt Cys	gac Asp	aac Asn 50	caa Gln	tgt Cys	aaa Lys	tca Ser	tgg Trp 55	gag Glu	ggt Gly	gcg Ala	gct Ala	cac His 60	gga Gly	gcg Ala	tgt Cys	191
cat His	gtg Val 65	cgt Arg	aac Asn	ggg ggg	aaa Lys	cac His 70	atg Met	tgt Cys	ttc Phe	tgt Cys	tac Tyr 75	ttc Phe	aac Asn	tgc Cys	gct Ala	239
aac Asn 80	gct Ala	gag Glu	gaa Glu	gct Ala	gct Ala 85	gct Ala	gct Ala	att Ile	cct Pro	gaa Glu 90	gct Ala	tct Ser	gaa Glu	gaa Glu	ctt Leu 95	287
gct Ala	caa Gln	gaa Glu	gaa Glu	gct Ala 100	cct Pro	gtg Val	tac Tyr	agt Ser	gaa Glu 105	gat Asp	cag Gln	aag Lys	ttg Leu	tgc Cys 110	caa Gln	335
agg Arg	cca Pro	agt Ser	cgt Arg 115	aca Thr	tgg Trp	tca Ser	gga Gly	gtc Val 120	tgt Cys	gga Gly	aac Asn	aat Asn	aac Asn 125	gca Ala	tgc Cys	383
aag Lys	aat Asn	cag Gln 130	tgc Cys	att Ile	aga Arg	ctt Leu	gag Glu 135	aaa Lys	gca Ala	cga Arg	cat His	gga Gly 140	tct Ser	tgc Cys	aac Asn	431
tat Tyr	cgt Arg 145	ttc Phe	cca Pro	gct Ala	cac His	aag Lys 150	tgt Cys	atc Ile	tgc Cys	tac Tyr	ttc Phe 155	cct Pro	tgt Cys	gcg Ala	aat Asn	479
gct Ala 160	gaa Glu	gaa Glu	gct Ala	gct Ala	gct Ala 165	gct Ala	att Ile	cct Pro	gaa Glu	gct Ala 170	tct Ser	gaa Glu	gaa Glu	ctt Leu	gct Ala 175	527
caa Gln	gaa Glu	gaa Glu	gca Ala	ccg Pro 180	gtt Val	tac Tyr	tct Ser	gaa Glu	gat Asp 185	gac Asp	gga Gly	gtg Val	aag Lys	ctc Leu 190	Cys	575
gac Asp	gtg Val	cca Pro	tcc Ser 195	gga Gly	acc Thr	tgg Trp	tcc Ser	gga Gly 200	cac His	tgc Cys	ggt Gly	tcc Ser	tcc Ser 205	agc Ser	aag Lys	623
tgc Cys	agc Ser	caa Gln 210	caa Gln	tgc Cys	aag Lys	gac Asp	agg Arg 215	Glu	cac His	ttc Phe	gct Ala	tac Tyr 220	gga Gly	gga Gly	gct Ala	671
tgc Cys	cac His 225	Tyr	caa Gln	ttc Phe	cca Pro	tcc Ser 230	Val	aag Lys	tgc Cys	ttc Phe	tgc Cys 235	Lys	agg Arg	caa Gln	tgc Cys	719
gct Ala 240	Asn	gct Ala	gag Glu	gaa Glu	gct Ala 245	Ala	gct Ala	gct Ala	att Ile	cct Pro 250	Glu	gct Ala	tct Ser	gaa Glu	gaa Glu 255	767

Leu Ala Glu Glu Ala Pro Val Tyr Ser Glu Asp Gln Asn Ile Cys 260 265 270	815
cca agg gtt aat cga att gtg aca ccc tgt gtg gcc tac gga ctc gga Pro Arg Val Asn Arg Ile Val Thr Pro Cys Val Ala Tyr Gly Leu Gly 275 280 285	863
agg gca cca atc gcc cca tgc tgc aga gcc ctg aac gat cta cgg ttt Arg Ala Pro Ile Ala Pro Cys Cys Arg Ala Leu Asn Asp Leu Arg Phe 290 295 300	911
gtg aat act aga aac cta cga cgt gct gca tgc cgc tgc ctc gta ggg Val Asn Thr Arg Asn Leu Arg Arg Ala Ala Cys Arg Cys Leu Val Gly 305 310 315	959
gta gtg aac cgg aac ccc ggt ctg aga cga aac cct aga ttt cag aac Val Val Asn Arg Asn Pro Gly Leu Arg Arg Asn Pro Arg Phe Gln Asn 320 325 330 335	1007
att cct cgt gat tgt cgc aac acc ttt gtt cgt ccc ttc tgg tgg cgt Ile Pro Arg Asp Cys Arg Asn Thr Phe Val Arg Pro Phe Trp Trp Arg 340 345 350	1055
cca aga att caa tgc ggc agg att aac taa tagagctc Pro Arg Ile Gln Cys Gly Arg Ile Asn 355 360	1093
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Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys
115 120 125

Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr 130 135 140

Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys Ala Asn Ala 145 150 155 160

Glu Glu Ala Ala Ala Ile Pro Glu Ala Ser Glu Glu Leu Ala Gln 165 170 175

Glu Glu Ala Pro Val Tyr Ser Glu Asp Asp Gly Val Lys Leu Cys Asp 180 185 190

Val Pro Ser Gly Thr Trp Ser Gly His Cys Gly Ser Ser Ser Lys Cys 195 200 205

Ser Gln Gln Cys Lys Asp Arg Glu His Phe Ala Tyr Gly Gly Ala Cys 210 215 220

His Tyr Gln Phe Pro Ser Val Lys Cys Phe Cys Lys Arg Gln Cys Ala 225 230 235 240

Asn Ala Glu Glu Ala Ala Ala Ile Pro Glu Ala Ser Glu Glu Leu 245 250 255

Ala Gln Glu Glu Ala Pro Val Tyr Ser Glu Asp Gln Asn Ile Cys Pro 260 265 270

Arg Val Asn Arg Ile Val Thr Pro Cys Val Ala Tyr Gly Leu Gly Arg 275 280 285

Ala Pro Ile Ala Pro Cys Cys Arg Ala Leu Asn Asp Leu Arg Phe Val 290 295 300

Asn Thr Arg Asn Leu Arg Arg Ala Ala Cys Arg Cys Leu Val Gly Val 305 310 315 320

Val Asn Arg Asn Pro Gly Leu Arg Arg Asn Pro Arg Phe Gln Asn Ile 325 330 335

Pro Arg Asp Cys Arg Asn Thr Phe Val Arg Pro Phe Trp Trp Arg Pro 340 345 350

Arg Ile Gln Cys Gly Arg Ile Asn 355 360

<210> 42

<211> 485

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
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<220>

<221> CDS

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	Met	Val	Asn	Arg	Ser	Val	Ala	Phe	Ser	Ala	Phe	Val	Leu	Ile	Leu	
	1			,	5					10					15	

47

ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga gaa cta tgc 95
Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys
20 25 30

gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac acg gga cat 143 Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His 35 40 45

tgt gac aac caa tgt aaa tca tgg gag ggt gcg gct cac gga gcg tgt 191 Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys

cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc aat tgt aaa 239
His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Lys
65 70 75

aaa gcc gaa aag ctt gct caa gac aaa ctt aaa gcc gaa caa ctc atc
Lys Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu Gln Leu Ile
80 85 90 95

gga aag agg atc gga aag agg atc gga aag agg cag aag ttg tgc caa 335 Gly Lys Arg Ile Gly Lys Arg Ile Gly Lys Arg Gln Lys Leu Cys Gln 100 105 110

agg cca agt cgt aca tgg tca gga gtc tgt gga aac aat aac gca tgc 383 Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys 115 120 125

aag aat cag tgc att aga ctt gag aaa gca cga cat gga tct tgc aac 431 Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn 130 135 140

tat cgt ttc cca gct cac aag tgt atc tgc tac ttt cct tgt taa 476
Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys
145 150 155

taggagete 485

<210> 43 <211> 157 <212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 sequence

Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys Glu

Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Lys Lys Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu Gln Leu Ile Gly Lys Arg Ile Gly Lys Arg Ile Gly Lys Arg Gln Lys Leu Cys Gln Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Arg Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys <210> 44 <211> 557 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence: Synthetic sequence <220> <221> CDS <222> (3)..(548) <400> 44 cc atg gtg aat cgg tcg gtt gcg ttc tcc gcg ttc gtt ctg atc ctt 47 Met Val Asn Arg Ser Val Ala Phe Ser Ala Phe Val Leu Ile Leu 10 ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga gaa cta tgc 95 Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys 25 20 gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac acg gga cat 143 Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His 35 tgt gac aac caa tgt aaa tca tgg gag ggt gcg gct cac gga gcg tgt 191 Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys 50 cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc aat tgt aaa 239 His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Lys 65

aaa gcc gaa aag ctt gct caa gac aaa ctt aaa gcc gaa caa ctc gct Lys Ala Glu Lys Leu Ala Gln Asp Lys Leu Lys Ala Glu Gln Leu Ala 80 85 90 95	287
caa gac aaa ctt aat gcc caa aag ctt gac cgt gat gcc aag aaa gtg Gln Asp Lys Leu Asn Ala Gln Lys Leu Asp Arg Asp Ala Lys Lys Val 100 105 110	335
gtt cca aac gtt gaa cat ccg atc gga aag agg atc gga aag agg atc Val Pro Asn Val Glu His Pro Ile Gly Lys Arg Ile Gly Lys Arg Ile 115 120 125	383
gga aag agg cag aag ttg tgc caa agg cca agt cgt aca tgg tca gga Gly Lys Arg Gln Lys Leu Cys Gln Arg Pro Ser Arg Thr Trp Ser Gly 130 135 140	431
gtc tgt gga aac aat aac gca tgc aag aat cag tgc att aga ctt gag Val Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln Cys Ile Arg Leu Glu 145 150 155	479
aaa gca cga cat gga tct tgc aac tat cgt ttc cca gct cac aag tgt Lys Ala Arg His Gly Ser Cys Asn Tyr Arg Phe Pro Ala His Lys Cys 160 165 170 175	527
atc tgc tac ttt cct tgt taa taggagctc Ile Cys Tyr Phe Pro Cys 180	557
<210> 45 <211> 181	
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115	120	125
Lys Arg Gln Lys Leu Cys Gln		
130 135		Tip ber er, va-
Cys Gly Asn Asn Asn Ala Cys 145 150	Lys Asn Gln Cys Ile 155	Arg Leu Glu Lys 160
Ala Arg His Gly Ser Cys Asn 165	Tyr Arg Phe Pro Ala 170	His Lys Cys Ile 175
Cys Tyr Phe Pro Cys 180		
<210> 46 <211> 485 <212> DNA <213> Artificial Sequence <220> <223> Description of Artificial Sequence	cial Sequence: Synthe	etic
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ttc gtg ctc gcc atc tca gat Phe Val Leu Ala Ile Ser Asp 20	atc gca tcc gtt agt Ile Ala Ser Val Ser 25	gga gaa cta tgc 95 Gly Glu Leu Cys 30
gag aaa gct agc aag acg tgg Glu Lys Ala Ser Lys Thr Trp 35	tcg ggc aac tgt ggc Ser Gly Asn Cys Gly 40	aac acg gga cat 143 Asn Thr Gly His 45
tgt gac aac caa tgt aaa tca Cys Asp Asn Gln Cys Lys Ser 50	tgg gag ggt gcg gct Trp Glu Gly Ala Ala 55	cac gga gcg tgt 191 His Gly Ala Cys 60
cat gtg cgt aac ggg aaa cac His Val Arg Asn Gly Lys His 65 70	Met Cys Phe Cys Tyr	ttc aat tgt gcc 239 Phe Asn Cys Ala

agt act act gtg gat cac caa gct gat gtt gct gcc acc aaa act atc

Ser Thr Thr Val Asp His Gln Ala Asp Val Ala Ala Thr Lys Thr Ile

gga aag agg atc gga aag agg atc gga aag agg cag aag ttg tgc caa Gly Lys Arg Ile Gly Lys Arg Gln Lys Leu Cys Gln

agg cca agt cgt aca tgg tca gga gtc tgt gga aac aat aac gca tgc Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys

aag aat cag Lys Asn Gln 130	tgc at Cys Il	t aga e Arg	ctt Leu	gag Glu 135	aaa Lys	gca Ala	cga Arg	cat His	gga Gly 140	tct Ser	tgc Cys	aac Asn	431
tat ctg ttc Tyr Leu Phe 145	cca go Pro Al	t cac a His	aag Lys 150	tgt Cys	atc Ile	tgc Cys	tac Tyr	ttt Phe 155	cct Pro	tgt Cys	taa		476
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Val Leu Ala	Ile Se	er Asp	Ile	Ala	Ser 25	Val	Ser	Gly	Glu	Leu 30	Суз	Glu	
Lys Ala Ser 35	Lys Th	r Trp	Ser	Gly 40	Asn	Cys	Gly	Asn	Thr 45	Gly	His	Cys	
Asp Asn Gln 50	Cys Ly	s Ser	Trp 55	Glu	Gly	Ala	Ala	His 60	Gly	Ala	Cys	His	
Val Arg Asn 65	Gly L	s His 70		Cys	Phe	Cys	Tyr 75	Phe	Asn	Cys	Ala	Ser 80	
Thr Thr Val		s Gln	Ala	Asp	Val	Ala 90	Ala	Thr	Lys	Thr	Ile 95	Gly	
Lys Arg Ile	Gly Ly 100	/s Arg	Ile	Gly	Lys 105	Arg	Gln	Lys	Leu	Cys 110	Gln	Arg	
Pro Ser Arg 115	Thr T	rp Ser	Gly	Val 120	Cys	Gly	Asn	Asn	Asn 125	Ala	Cys	Lys	
Asn Gln Cys	Ile A	rg Leu	Glu 135	Lys	Ala	Arg	His	Gly 140	Ser	Cys	Asn	Tyr	
Leu Phe Pro 145	Ala H	is Lys 150		Ile	Cys	Tyr	Phe 155	Pro	Cys				
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<223> Description of Artificial Sequence: Synthetic

<213> Artificial Sequence

sequence

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					tca Ser					Val						95
					acg .Thr				Asn					Gly		143
					aaa Lys			Glu					Gly			191
					aaa Lys		Met					Phe				239
aac Asn 80	gcg Ala	gcc Ala	gac Asp	gag Glu	gtg Val 85	gct Ala	acc Thr	cag Gln	ctg Lev	ttg Leu 90	Asr	ttt Phe	gac Asp	ctt Leu	ctt Leu 95	287
					gtc Val					Gly						335
					aca Thr				val					Asn		383
					att Ile			Glu					Gly			431
					gct Ala		Lys					Phe			taa	479
tagg	gagct	c														488
<211 <212)> 49 > 19 > PF > A1	8 RT	icia	l Se	quen	ce										
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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys

Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His 50 55 60

Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser Asn 65 70 75 80

Ala Ala Asp Glu Val Ala Thr Gln Leu Leu Asn Phe Asp Leu Leu Lys 85 90 95

Leu Ala Gly Asp Val Glu Ser Asn Pro Gly Pro Gln Lys Leu Cys Gln
100 105 110

Arg Pro Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys 115 120 125

Lys Asn Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn 130 135 140

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1 5 10 15

ttc gtg ctc gcc atc tca gat atc gca tcc gtt agt gga gaa cta tgc 95
Phe Val Leu Ala Ile Ser Asp Ile Ala Ser Val Ser Gly Glu Leu Cys
20 25 30

gag aaa gct agc aag acg tgg tcg ggc aac tgt ggc aac acg gga cat 143 Glu Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His 35 40 45

tgt gac aac caa tgt aaa tca tgg gag ggt gcg gct cac gga gcg tgt 191 ·Cys Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys 50 55 60

cat gtg cgt aac ggg aaa cac atg tgt ttc tgt tac ttc aat tgt tcc His Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser 65 70 75	239
aac gcg gcc gac gag gtg gct acc cag ctg ttg aat ttt gac ctt ctt Asn Ala Ala Asp Glu Val Ala Thr Gln Leu Leu Asn Phe Asp Leu Leu 80 85 90 95	287
aag ctt gcg gga gac gtc gag tcc aac cct ggg ccc atg gct aag ttt Lys Leu Ala Gly Asp Val Glu Ser Asn Pro Gly Pro Met Ala Lys Phe 100 105 110	335
gcg tcc atc atc gca ctt ctt ttt gct gct ctt gtt ctt ttt gct gc	383
ttc gaa gca cca aca atg gtg gaa gca cag aag ttg tgc caa agg cca Phe Glu Ala Pro Thr Met Val Glu Ala Gln Lys Leu Cys Gln Arg Pro 130 135 140	431
agt cgt aca tgg tca gga gtc tgt gga aac aat aac gca tgc aag aat Ser Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn 145 150 155	479
cag tgc att aga ctt gag aaa gca cga cat gga tct tgc aac tat cgt Gln Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Arg 160 165 170 175	527
ttc cca gct cac aag tgt atc tgc tac ttt cct tgt taa taggagctc Phe Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 180 185	575
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Lys Ala Ser Lys Thr Trp Ser Gly Asn Cys Gly Asn Thr Gly His Cys 35 40 45	
Asp Asn Gln Cys Lys Ser Trp Glu Gly Ala Ala His Gly Ala Cys His 50 55 60	
Val Arg Asn Gly Lys His Met Cys Phe Cys Tyr Phe Asn Cys Ser Asn 65 70 75 80	
Ala Ala Asp Glu Val Ala Thr Gln Leu Leu Asn Phe Asp Leu Leu Lys 85 90 95	

Leu Ala Gly Asp Val Glu Ser Asn Pro Gly Pro Met Ala Lys Phe Ala 105

Ser Ile Ile Ala Leu Leu Phe Ala Ala Leu Val Leu Phe Ala Ala Phe 115

Glu Ala Pro Thr Met Val Glu Ala Gln Lys Leu Cys Gln Arg Pro Ser 130 135 140

Arg Thr Trp Ser Gly Val Cys Gly Asn Asn Asn Ala Cys Lys Asn Gln 145 150 155 160

Cys Ile Arg Leu Glu Lys Ala Arg His Gly Ser Cys Asn Tyr Arg Phe 165 170 175

Pro Ala His Lys Cys Ile Cys Tyr Phe Pro Cys 180 185

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Oligonucleotide

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carttraant ancanaaarc acat

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(213) Attiticial bequence	
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Lys Asp Glu Leu
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Asp Val Glu Pro Gly Gln Lys
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Glu Pro Gly Gln Lys Leu 20

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Thr Lys Thr Ile Gly Lys Arg Gln Lys Leu 20 25